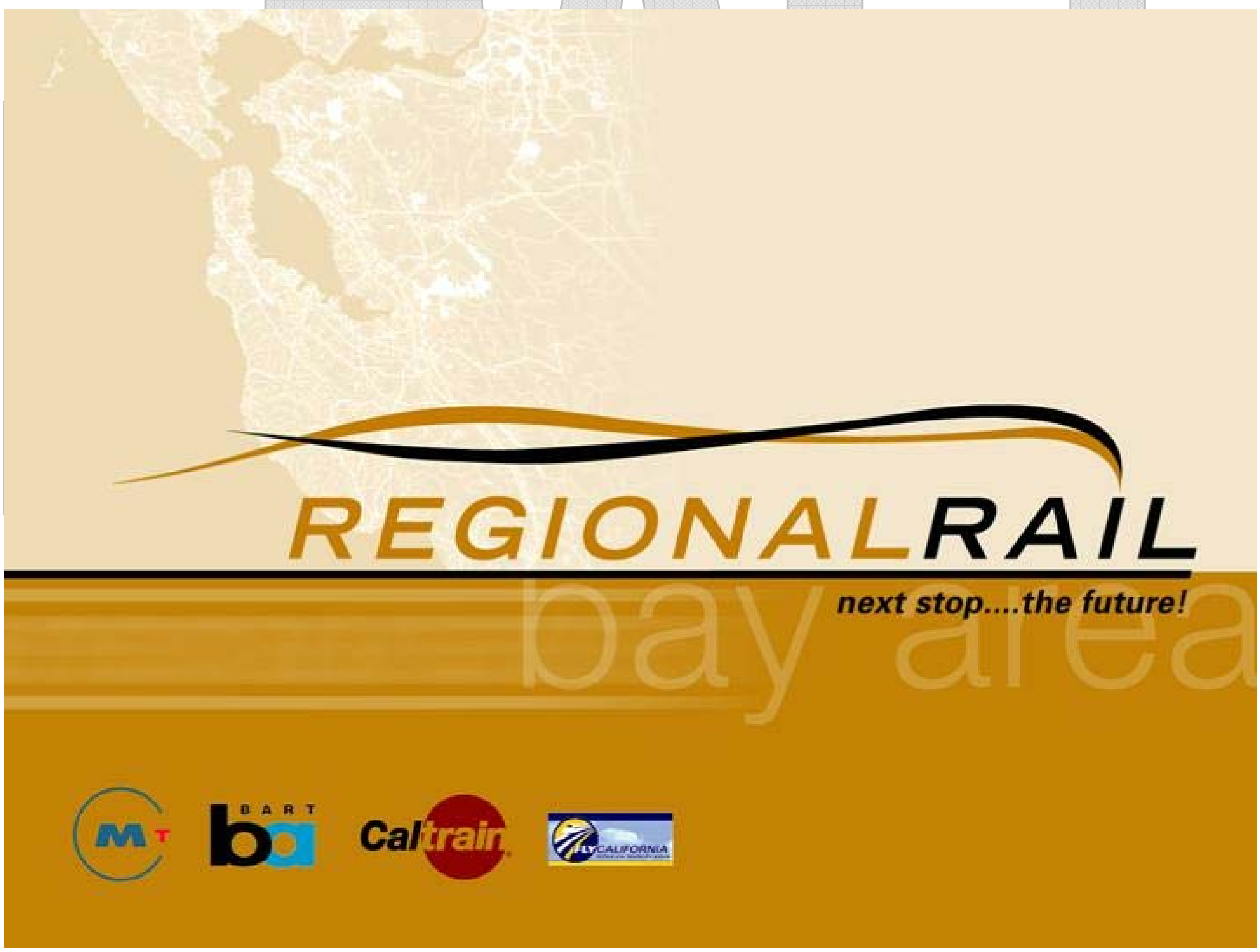
BAY AREA REGIONAL RAIL PLAN

Technical Memorandum 4g

Summary of Capacity Issues on Bay Area Regional Railroad System



March 28, 2007

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A tyco International Ltd. Company
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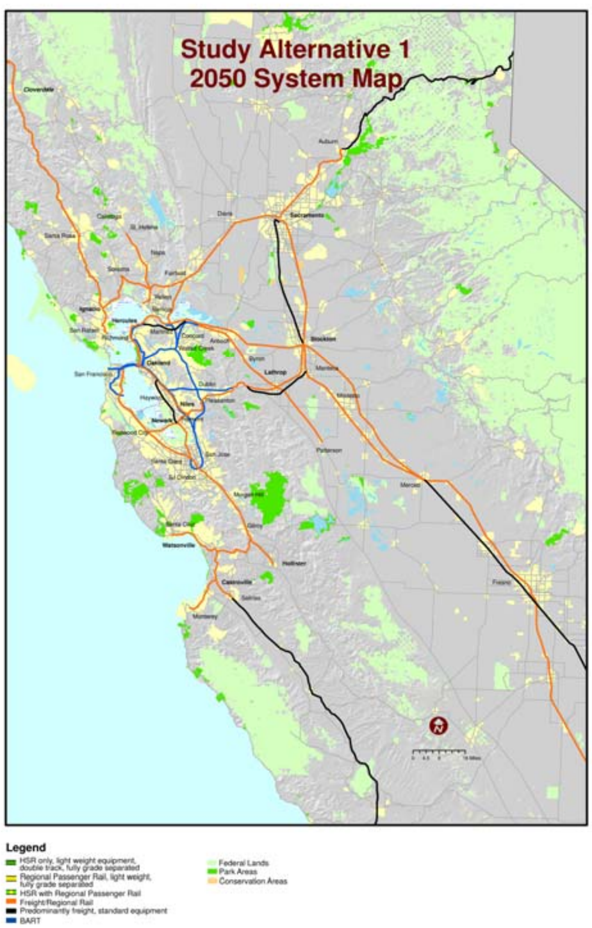
Scope of work

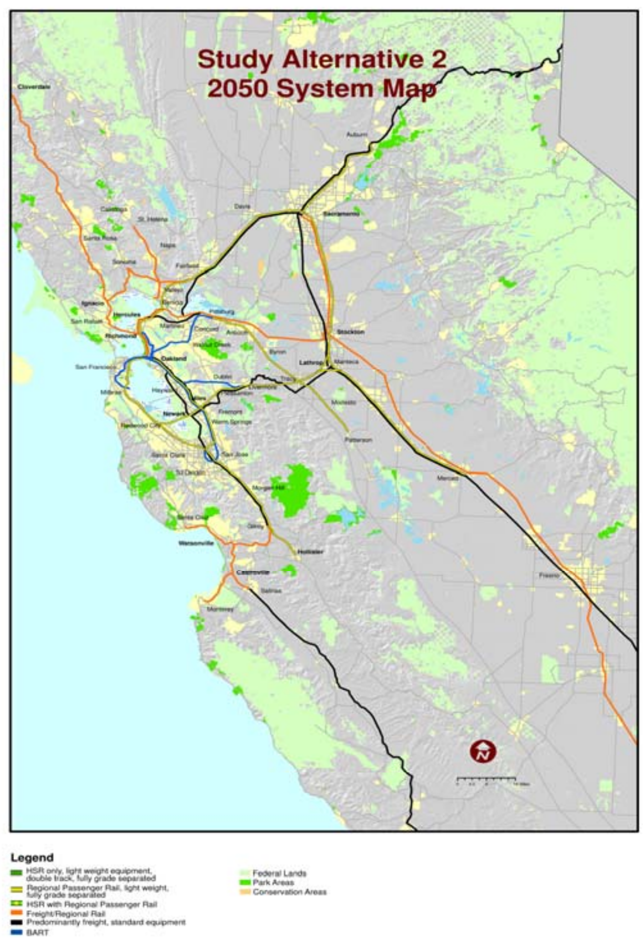
The Bay Area Regional Rail Plan Consultant team budget is for coordination only; capacity studies were to have been performed by others. It was previously determined the type of capacity studies anticipated would be inappropriate for a planning level study.

Consultant to develop a "sketch plan" evaluation of capacity based upon readily-available information supplemented by planning level analysis. Mainline cross sections for principal line sections have been evaluated based upon general magnitude of intended freight and passenger services to be supported (For mainline cross sections see Technical Memorandum 4b).

General

The corridor rail alternatives developed under Technical Memorandum 3b were considered as the basis for this Technical Memorandum. These are shown as Alternative 1 and 2.





This evaluation reviews and categorizes into three typologies the corridors in the Regional Rail Plan Area. The passenger and freight rail alternative corridors under consideration for both standard (compliant) vehicles and light weight (non-compliant) vehicles are shown on the next page as the corridor typologies.


2050 System Density Map
SMART Corridor
Auburn
Sacramento
Davis
Calistoga
St. Helena
Santa Rosa
Napa
Fairfield
Suisun
Sonoma
Vallejo
Benicia
Ignacio
San Rafael
Martinez
Concord
Antioch
Walnut Creek
Stockton
Oakland
Byron
Lathrop
Manteca
San Francisco
Dublin
Hayward
Pleasanton
Tracy
Modesto
Newark
Niles Junction
Redwood City
Fremont
Patterson
Santa Clara
San Jose
SJ Diridon
Merced
Morgan Hill
Santa Cruz
Gilroy
Watsonville
Hollister
Castroville
Fresno
Salinas
Monterey
Legend
High Density Lines
Medium Density Lines
Low Density Lines
Federal Lands
Park Areas
Conservation Areas

The corridor typologies include proposed and/or existing: (1) high density, (2) medium density, and (3) low density lines. The other fourteen corridors are then classified by typology, providing a general overview of the capacity constraints and opportunities for each corridor.

These corridors have been evaluated without High-Speed Rail. The non-compliant routes, shown in yellow could be a pre-cursor alignment for high-speed rail. When high-speed rail is incorporated it must be on its own separate two track system.

High density corridors are those proposed for major growth either in freight traffic and/or passenger traffic, possible electrification, use of electrified and possibly non FRA compliant passenger equipment. These are potential four track corridors, with freight and passenger trains operating on separate exclusive use tracks. Corridors that either fit in this category today or are forecast to reach this status in the future include: **Sacramento to Oakland, Oakland to San Jose, Sacramento to Merced, and San Francisco to San Jose.**

Medium density corridors are those with mixed freight and regional commuter operations, which use compliant equipment and are not expected to be electrified. Corridors in this category include: **Auburn to Sacramento, Stockton to Martinez, Lathrup to Martinez, Niles Junction to Stockton, Redwood Junction to Newark, San Jose to Salinas.** [1]

Low density corridors are those with either minimal freight or low passenger use, usually offering only peak hour service, possibly only one direction in the morning and the other direction in the evening. This type of corridor will have freight with non-electrified regional commuter operations. These corridors include: **The Smart Corridor, Ignacio to Fairfield/Suisun, St. Helena to Vallejo, Tracy to Los Banos, Santa Cruz to Watsonville Junction, Castroville to Monterey, and Carnadero to Hollister.**

[1] Note: The future route of High Speed Rail could shift either the Niles Junction to Stockton or the San Jose to Salinas corridors from medium to high density depending on the route alternative chosen.

1. OVERVIEW OF RAIL CAPACITY CONSIDERATIONS

A. Introduction

Rail line capacity is a function of a number of factors many of which are not readily apparent. Determining the capacity of any particular rail line is complex. Modeling is usually required by the track owners before any modifications are made. There are other major factors that determine the capacity of rail lines, including:

- Number of main tracks,
- Location and configuration of crossovers.
- Number of locations where trains can meet and or pass,
- Ability to get freight trains clear of main line tracks (passing tracks),
- Location and size of freight yards,
- Ability to queue arriving trains off of main tracks,
- Type of signal system and method of traffic control, i.e.: double track, ABS, CTC, track warrants,
- Signal spacing,
- Basic track speeds,
- Grades and curvature,
- Location and configuration of stations and passenger platforms,
- Passenger train frequencies,
- Express passenger vs. local passenger,
- Traffic mix as between freight and passenger,
- Horse Power per Ton (hpt) of thru freight trains,
- Thru freight vs. local freight,
- Amount of local industries and configuration of supporting tracks, and
- Organization of local work and enroute pick-ups and set outs

Factors that tend to reduce or restrict capacity include, among others:

- Distance between stations
- Ability to meet or pass trains stopped at stations largely determined by platform configuration
- Amount of switching activity blocking or fouling the main line tracks
- Locations where trains tend to queue up
- Capacity restrictions around yards and terminals
- Interchange locations
- Junction points

Typical points of Congestion include:

- Yards and terminals,
- Major industries,
- Interchange points, and
- Passenger stations.

B. Freight Railroad Long Range Planning

In addition, long range forecasting of railroad traffic levels for freight carriers is problematic. Freight railroads in the United States, for instance the Union Pacific Railroad (UP), generally do not forecast traffic growth in great detail. They rarely attempt to forecast beyond a five year planning horizon as there are many variables to consider. It is the railroads' customers and the state of the National economy that govern the rate of growth for the most part. . The longest term projections do not reach out beyond ten years at the present time, and railroads consider these growth projections as confidential and proprietary, and they are not eager to share them. From the perspective of the railroads, forecasts that reach beyond ten years would be considered as educated guesses, at best.

C. Commuter Rail Access to Freight Railroad Trackage

As a general rule, Freight Railroads own and control their own rail lines. Commuter railroad access to freight railroad trackage is under the control of the track owner or host carrier. Access by passenger operators is subject to negotiated conditions that are established by the track owner.

Frequently, these commuter railroad access rights establish an upper limit on the number of passenger trains that may be operated over any line of railroad. The hours of operation may also be limited.

For instance, in the case of the Capitol Corridor and Amtrak-San Joaquin trains on the Martinez Subdivision, the trains are limited to twenty minute periods in any one hour. The UP's predecessor, the Southern Pacific, negotiated a limit on the Martinez Subdivision of twenty train pairs of State supported trains on any portion of the Subdivision. With four pair of San Joaquins and sixteen pairs of Capitol Corridor trains, the passenger operators have reached this cap today. If the San Joaquins were rerouted over the Altamont as suggested as one of the alternatives then a corresponding increase in the Capitol corridors would be possible. ACE is presently limited to four pair of trains in any 24 hours. There have been some negotiations with the UP to raise this to six pair, but these negotiations have not been finalized.

Most of the corridors under consideration for expansion are owned and controlled by the UP, and a number of factors therefore affect the ability to remedy capacity issues or implement changes. Examples include:

- Any new construction must meet with their approval and be consistent with UP design standards. This is relevant to proposals to alter track center spacing and to construction of new or altered passenger platforms.

- The corridor owner has the final say on any new station locations.

- UP has a policy not to allow passenger track speeds in excess of 79 mph on mixed freight/passenger trackage.

- UP is not in favor of electrification of mixed freight passenger trackage. If they do agree, they will most likely require a wire height which will provide ample clearance above the top of rail to clear the tallest possible double stack car (at least 24 feet above top of rail) This in turn may require raising overhead structures, particularly highway overpasses. High wire height will also restrict the speed of the passenger trains due to the pantograph / wire interaction.

- In almost every instance in the past, the UP has not been willing to agree to temporal separation of freight and passenger operations to allow for either commuter windows or for the use of non-compliant passenger vehicles.

- Several of the corridors under consideration for expansion of passenger operations, while operated by Short Lines, in particular, The California Northern are actually operated under a lease from the UP. The UP is the owner and imposes the same restrictions on these lines as they do on those lines which they operate themselves. In each instance of a Short Line Lease, the UP has retained the passenger franchise. (the UP actually still holds the Intercity Amtrak(non commuter)franchise on SFJPB trackage between San Jose and San Francisco)

- Of prime concern to the corridor owner are issues of liability and also the maintainability of new construction.

In short, UP will resist initiatives that would raise its cost of doing business.

D. Practical Capacity vs. Theoretical Capacity

Rail capacity is calculated in a two-step process. First, a “theoretical capacity” is determined, assuming perfect conditions and operations. Second, “practical capacity” is determined by considering factors, such as possible disruptions such as drawbridge openings, signal needs, human decisions, weather, possible equipment failures, over dwell at stations for handicap access, and traffic level fluctuations because of seasonal or weekly cycle fluctuations

Practical capacity is considered to be about 60 percent of the theoretical capacity and provides reasonably reliable service; it is similar to a highway level of service of “C.” At higher percentages, rail congestion increases, delays enroute increase, and service reliability deteriorates quickly.

E. Track Center Issues

While the California PUC (CPUC) will allow main line track centers of 15 feet, the UP, for a number of reasons including FRA maintenance of way worker-safety regulations and liability concerns, now frequently requires track centers in excess of 27 feet; and a minimum of 25 feet from the edge of the right of way. This in turn means that the maximum of three main tracks can be constructed in a 100 foot right of way. In addition, as a practical matter, even with a 100 foot right of way there may not even be room for a third main track because of the presence of side tracks, station platforms, bridge or overpass abutments, or the presence of berried pipelines or fiber optic communication conduits in the right of way. The UPRR, the Port of Oakland and Capitol corridor are presently in discussion of providing four tracks from Oakland to Richmond. This means they are going to compromise “something”; track centers (either for all tracks or just the passenger train tracks), side clearances or purchase additional right-of-way as necessary.

2. PORT OF OAKLAND RELATED GROWTH

The Port of Oakland recently completed a twenty year growth plan. Using their most aggressive forecast that assumes a major increase in the proportion of containers arriving or leaving the port by rail, rail traffic could grow by close to 300 percent, as reported in the prior regional rail study. Some of this growth in rail traffic will rely on implementation of a system of inland port locations in the San Joaquin Valley – a concept knows as the California Inter-Regional Intermodal System (CIRIS).

The greatest bulk of the port related rail traffic would be to inland locations located at least 1,000 miles to the east. Because there are two class one rail carriers serving the Port of Oakland and each carrier has several routing choices that serve multiple destinations and inland inter change locations, it is difficult to allocate the growth between carriers and routes. However, traffic leaving the Port of Oakland initially must either travel over the Martinez or the Niles and Coast Subdivisions of the UP. These lines are discussed in detail later in this paper.

3. CAPACITY SIMULATION MODELS

There are a number of simulation models that have been employed to predict rail line capacity. Most of the Class One Freight carriers use some version of a model known as RTC to predict capacity and to test various strategies for increasing capacity. However, operations research type models tend to be somewhat academic, they rely on the optimization of objective functions that don't necessarily reflect the realities of actual operations, or they use stochastic methods that depend upon statistically significant sample sizes. These models may not fully reflect the realities of daily train operations. Furthermore, models may assume away some real world problems, ignoring some and minimizing others.

As an example, the models often assume that trains will immediately react to clear signals, starting immediately and rapidly accelerating to full track speed. In the real world, the train may be stopped way back from the signal, it may be under-powered, and may be slow to accelerate. Another example is the lack of acknowledgement in the model of the time consumed for routine track inspection and maintenance. For these reasons, the Class One Freight carriers do not fully trust model results unless the Railroad itself has a strong say in the assumptions used to build the model and oversees running of the model themselves.

The use of the RTC model (or any other) is not part of the scope of work. Initially it was to be provided by others.

A. Rail Traffic Controller (RTC)

RTC is still the preferred model, and some basic details of that model are provided below. RTC is a railroad dispatch simulation model built on a computer program designed to simulate both freight and passenger rail operations in either a planning environment or an online control center.

The model has four primary uses:

1. **Network creation and modification:** Specifying and drawing a track network as well as modifying parameters in existing railroad networks. This mode is intended to be used offline and is restricted to authorized users.

2. **Single Train Performance Calculator (TPC) run:** Simulating the performance of a single train running through the network without interference from other trains to obtain a minimum run time.

3. **Full schedule simulation:** Simulating the movement of many trains interacting with one another throughout a railroad network. While in this mode, RTC uses standard operating rules to resolve both meet and pass conflicts between trains. Train performance computations are integrated with conflict resolution and path seeking logic. RTC will accumulate train delay by individual trains as well as by train type.

4. **Control center logic module:** RTC can be used to perform most train dispatcher duties so that dispatchers can concentrate on safety oversight and line management. RTC may enable dispatch personnel to become exception managers by freeing them from many routine duties.

RTC Networks

The fundamental building blocks in RTC networks are nodes and links. Nodes represent locations were as links represent track connecting nodes. A major prerequisite to obtaining useful results from RTC is the accurate description of track and signal layouts using nodes and links. The minimum level of network detail in RTC requires nodes that represent switch points, foul points, signals, station stops, speed change locations and major grade change locations. The corresponding links connecting these nodes must have accurate lengths, speed limits, and ruling grades. Users can further refine networks with link curvature and closely spaced nodes to increase the accuracy of the TPC calculations. However, at some point, the specification of more detailed track geometry becomes counter-productive, as other random real world events will overwhelm the minutia of track detail.

RTC's Train Performance Calculator

RTC's integrated TPC requires the availability of accurate locomotive data as well as train length, tonnage, and number of loads and empties. The TPC takes this information in combination with tractive effort curves, dynamic braking curves and air brake characteristics to determine run time between locations. These computations are performed at user specified increments and can be displayed either graphically or in tabular formats.

RTC trains

The minimum level of detail needed to simulate a train in RTC includes specifying the train's origin, destination, intermediate station stops, work events, and crew change points. Users must specify a departure time from a train's origin node. Departure and arrival times after the origin node are optional. However, if intermediate stop locations, such as crew change points, do not have specified departure times, they must have some minimum dwell time specified.

RTC models train delays as needed to achieve a solution where all trains eventually make their trips from origin to destination. If users request an excessive number of trains to operate, then RTC will delay trains at terminals until line capacity becomes available. Users may randomly vary departure times, dwell times, and various equipment detectors (implying unplanned stops) to test the robustness or reliability of their schedules.

Increasing incidents of trains held at origin or major on line delays imply that a line of railroad is reaching capacity. Model users can adjust arrival and departure times and other parameters to improve schedules. However, as traffic density increases, this inevitably results in some trains realizing more delay in the model.

RTC local parameter settings

The RTC logic contains a set of operating rules that accommodate the needs of the various railroads. Local railroad operating rules that deviate from the norm are handled through special parameter settings.

Changing speed limits

RTC can be used to simulate the impact of track speed changes, or slow orders on schedules by simply decreasing either maximum train or maximum link speeds. For example, the effects of lowering the speed limits to save on track maintenance and fuel costs on low density line can be measured. Or, conversely, the effect of increasing speed limits on high density lines to relieve congestion can be assessed.

Other Frequent Uses of RTC

1. Measuring the impact of adding a new high priority train to a congested corridor.

2. Measuring the impact of slow orders

3. Scheduling of maintenance of way windows

4. Evaluating the costs and benefits of investing in Centralized Traffic Control (CTC)

5. Evaluating the costs and benefits of modifying, eliminating, or networking interlockings within complicated terminal districts

6. Evaluating moving or adding crossovers in multiple track territories

7. Evaluating the impact of extending or removing sidings

B. Northern California Rail Advisory Group – Use of RTC Simulations

The Northern California Rail Advisory Group (NOCRAP) was formed in the fall of 2000 to coordinate scheduling of various passenger operating entities that operate over the UP in Northern California. The group's purpose is to provide input to the UP and to advise the UP on their growth projections and operating requirements. A major function of the NOCRAP Group has been to co-ordinate schedule changes among the various passenger operators.

UP and the NOCRAP operators have been funding an on-going capacity analysis of the UP rail lines in Northern California, this analysis has been performed using the RTC model and managed by Washington Infrastructure. To date, the Coast, Niles, Martinez, Roseville, Fresno, Oakland, Stockton, Sacramento, Canyon, and Tracy Subdivisions have been modeled, as has the San Francisco Peninsula Subdivision of Caltrain. NOCRAP participants include UP, California Department of Transportation, Caltrain, CCJPA - Capital Corridor, Amtrak - San

Joaquin, Amtrak Intercity, Altamont Commuter Express (ACE), the Coast Rail Coordinating Committee, and the Transportation Agency of Monterey County (TAMC).

The information required by Washington Infrastructure to perform simulations has been provided, under confidentiality agreements by the various parties, who have shared the costs of constructing the network and performance of the various case study RTC model runs. The results of the model runs are considered to be proprietary and are also covered by the confidentiality agreements. Additional parties who wish to participate must agree to the confidentiality agreement. They are then required to pay a pro-rata share of the cost to develop the base RTC model. Thus, the model results are not available for use in this Regional Rail Capacity review.

Additionally, the planning horizon used for the simulations is five years, and the participants are generally not confidant of data that reaches beyond this planning horizon. This represents an additional reason for not using the RTC model for this capacity review.

4. CAPACITY REVIEW BY RAIL LINE

Following is a discussion of the capacity of the rail lines within the Regional Rail Study area. The review is not the result of a model run, for the reasons described above, but rather a discussion of the major factors affecting the rail line's capacity today and into the future, taking into account the factors and context provided above.

A. Rail Line Typology

This evaluation reviews and categorizes into typologies three corridors in the Regional Rail Plan Area. The other fourteen corridors are then classified by typology, providing a general overview of the capacity constraints and opportunities for each corridor. The corridor typologies include proposed and/or existing: (1) high density, (2) medium density, and (3) low density lines. The expected typical sections for the major corridor or portions thereof are shown on Exhibit 4 and the cross sections are depicted in Appendix A.

High density corridors are those proposed for major growth either in freight traffic and/or passenger traffic, possible electrification, use of electrified and possibly non FRA compliant passenger equipment. These are potential four track corridors, with freight and passenger trains operating on separate exclusive use tracks. Corridors that either fit in this category today or are forecast to reach this status in the future include: **Sacramento to Oakland, Oakland to San Jose, Sacramento to Merced, and San Francisco to San Jose.**

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B. High Density: UP Martinez Subdivision - Capitol Corridor

The UP Martinez Subdivision is an example of a High Density Corridor at the present time. The Martinez Subdivision (Capitol Corridor) has a weekday average of 44 regular passenger trains, approximately 32 to 40 UP local and through freight movements and 6 to 8 BNSF Trackage rights freight movements. This Subdivision is operating at or above practical capacity at the present time. Any maintenance work will result in significant delays. Line interruptions caused by bridge openings (the bridge at Benicia crossing the strait and the I Street bridge in Sacramento) or delays from mechanical breakdown or grade crossing accidents cause a ripple effect of cascading delays.

Capitol Corridor trains have sometimes delayed in excess of two hours enroute between Sacramento and Oakland. This leads to a fairly high degree of unreliability for rail passengers.

UP recently embarked on a bridge replacement and tie renewal project. To accomplish this work, it was thought necessary to divert several through freight movements to the Fresno and Oakland Subdivisions. In addition several mid-day Capital Corridor trains have been annulled and while others have been rescheduled.

To build redundancy and robustness into the system, and increase on time performance, there are a number of initiatives under discussion. For several years, the UP and the CCJPA have been performing capacity simulations to identify capacity related issues and potential solutions short of adding an additional main track all the way from Sacramento to Oakland. There are many mitigating measures that have been identified, and these measures serve as an illustration of the more generalized discussion above.

- Roseville Yard is an area of major congestion. The original suggestion was to build seven miles of additional main track. Simulations have identified additional receiving tracks as a more effective solution.

- The junction of the Fresno Subdivision and the Martinez Subdivision in Elvas is an example of a junction point with major congestion. Track speeds through this junction are relatively slow and portions of this junction are single track. (They were two tracks in the past.)

- Passenger trains queue up at the Sacramento Passenger Depot due to the need for a freight bypass and more tracks with platform access. This location becomes critical when passenger trains are out of their slots.

- The movable span on the I Street Bridge must be raised under federal laws for the passage of water traffic. Mitigation of this delay factor is extremely difficult and costly. There does not appear to be a real fix here.

- The addition of crossovers at the west end of the Yolo Causeway could assist with congestion issues at Davis.

- The Davis interchange with the California Northern and the UP is performed on sidings on either side of the main UP line tracks. However, UP trains must occupy the main tracks when picking up and setting out cars for the Cal Northern. A possible solution is for UP to grant trackage rights between Davis and Roseville to the Cal Northern. This is an internal UP issue with both commercial and operating implications and is not attractive to the UP.

- The platform arrangement at the passenger station at Davis does not permit trains to meet or pass if the center passenger platform is in use.

- The industrial spurs between Davis and Suisun require main line occupancy to service, with the exception of the drill track at Tolenas.

- The interchange to the Cal Northern at Suisun requires main line occupancy for interchange of cars. This would be an ideal location for a long passing track on the west side of the main lines that would permit UP freight trains interchanging to the Cal Northern to work in the clear of the mail tracks. This would also provide a location where a freight train could be both met and passed by closely following passenger trains.

- There are presently too few support tracks at Benicia to perform pickups and setouts of traffic to and from the auto loading/unloading facilities. The eastern main track is frequently not available for passenger trains or even other freights. This is a location where a third main track between the Benicia Bridge and Bahia would have a high utility. This could also serve as a location where trains queued up during bridge span openings could be sorted, specifically where passenger trains lined up behind freight trains could pass. To fully utilize this additional track, a new set of crossovers just north of the Suisun Bay Bridge would be needed, and would have a high utility even if the additional main track were not constructed.

- Construction of an additional main track west of the Martinez Passenger Station to bypass freight congestion at Ozol yard is under consideration.

- Construction of a third main track between Richmond and Emeryville would allow freights to move past passenger trains stopped at the closely spaced stations of Richmond, Berkeley, and Emeryville. The UPRR, the Port of Oakland and Capitol Corridor are talking about potentially four tracks

- New crossovers and platform reconfiguration at Emeryville would eliminate two sections of what amounts to single track gauntlets for passenger operations on both the northern and southern approaches to the station at Emeryville.

California DOT State Rail Plan

Excerpts from the 2005-2006 thru 2015-2016 California State rail Plan
The Department proposes an increase in service frequency:

- From 4 to 5 daily round trips between Oakland and Bakersfield.

- From 12 to 18 daily round trips between Oakland and Sacramento (Note that frequency was increased to 16 daily round trips in 2006).

Under current operations and laws, these initiatives will not be realized without the consent of the UP, and UP clearly would agree only if additional capacity can be built into the Martinez Subdivision or if routed differently.

Future Expansion to Four Tracks

To reach the desired level of capacity for the future growth of this corridor, it is clear that ultimately this corridor will need to be expanded to four tracks, two separate tracks for passenger operations and two tracks for freight operations. Given the proposed growth of passenger operations, the desirability of using some combination of electrification and or non-compliant passenger equipment and the desirability of operating at speeds in excess of 79 mph, freight and passenger operations must be separated. In addition, there is a high potential for significant freight traffic growth in this corridor.

It is also clear from the above discussion of corridor owner concerns that sufficient space for these four tracks, if built to UP specifications, will not fit within the existing right of way, even at locations not already coexisting with side tracks and passenger platforms.

There are several possible solutions to the problem:

- First, purchase additional right of way. This may still be possible in rural areas of the corridor today. However, because of rapid urbanization, proximity to the bay, topography and or wetland issues, this solution may not be practical. In addition, significant portions of the corridor are encumbered with auxiliary tracks supporting the freight operations.

- Second, convince the UP to relax its track center standards, if only for the passenger operation. The past implication for this alternative is that the passenger entities would need to indemnify UP from all liability. This solution is almost impossible given the State of California Constitutional prohibitions. Containment walls are a potential solution for short sections.

- Third, place the passenger trackage on elevated pylons in areas where sufficient existing ROW does not exist or in areas where adjacent, non rail property, is unavailable or too costly.

- Fourth, locate new right of way for the expanded passenger operations. This solution may be particularly attractive in the severely constrained right of way area between Pinole and Suisun. A new alignment crossing the Carquinez Strait in the vicinity of Interstate 880, at the same elevation as the highway and following the freeway to Cordelia, would eliminate all of the present train delay issues presently experienced at the existing Martinez-Benicia rail bridge. This new alignment would also avoid all of the present congestion in the industrial territory between Pinole and Benicia. It would also avoid the potential wetland issues between Benicia and Suisun. In addition, Martinez would still be served by Amtrak San Joaquin trains and by the intercity trains.

C. Medium Density – Union Pacific Oakland Subdivision

The UP Oakland Subdivision is an example of a medium density corridor. This corridor is presently operating well below "Practical Capacity."

The Oakland Subdivision connects with the two main tracks of the Niles Subdivision at Melrose, milepost (mp) 10.56. It is basically a single track mainline with passing sidings controlled by a CTC system. It parallels the Niles Subdivision from Melrose to Niles Junction where there is a second connection to the Niles Subdivision at mp 30.36. At the present time, this northern portion is used only for local movements, and there is no through-train operation.

The portion of the Oakland Subdivision from Niles Jct. at mp 30.36 to Lathrup at mp 84.45 is used by both UP freight trains and Altamont Commuter Express (ACE) commuter passenger trains. At Lathrup, the Oakland Subdivision, which continues north to Stockton at mp 92.92, also connects with the two main tracks of the Fresno Subdivision of the UP. The Fresno Subdivision parallels the Oakland Subdivision from Lathrup on to Stockton.

The Oakland Subdivision was handling 16 to 18 UP Freight trains and in addition, 2 to 4 SP Trackage rights trains at the time ACE commuter service began with six trains per day, Monday through Friday.

ACE trains leave the Oakland Subdivision at Niles Junction, operating on the Niles Subdivision to Newark and then south to San Jose on the Coast Subdivision. Since the UP acquisition of the SP, ACE trains frequently operate via the Fresno Subdivision rather than the Oakland Subdivision Lathrup and Stockton. The Stockton passenger station used by ACE is actually located on the Fresno Subdivision, and by using the Fresno Subdivision, the ACE trains avoid the congestion around the UP's Lathrup Intermodal Facility and the UP's Stockton Yard.

Traffic levels have actually decreased significantly on the Oakland Subdivision since the UP acquired the SP in 1996. Much of the traffic that used to traverse the Oakland Subdivision between Sacramento, Stockton and Oakland, San Jose and Milpitas now takes the more direct, shorter route to Sacramento by utilizing the Martinez Subdivision. ACE service is now four pair of trains each weekday. However, UP freight operations are now at 8 to 10 train movements per day.

ACE had reached a tentative agreement with the UP to run up to 6 pair (12) trains per day between Stockton and San Jose. ACE agreed to upgrade the connection between the Oakland Subdivision and the Fresno Subdivision at Lathrup, and to either lengthen or build new sidings between Lathrup and Niles Junction. However, simulations show that, at present traffic levels, this subdivision does not appear to need them. The siding at Hearst (mp 38.55) is relatively short at 4,175 feet. The industrial support track at Radum (mp 43.40) is more than two miles long and could be upgraded to a full CTC controlled siding. The siding in Livermore named Trevarno (mp 49.20) is also more than two miles long. The siding at Altamont (mp 56.73) is 5,418 feet long and could easily be lengthened. Midway siding at mp 63.92 is presently 5,508 feet long and could also be lengthened out to at least 8,000 feet. There is ample room to construct an additional 8,000 foot siding between Midway and Tracy. The siding at Tracy (mp 73.85) is already 10,692 feet long. Wyche at mp 82.74 is presently 5,377 feet long and can easily be extended to 8,000 feet. In fact, only the extension of Hearst presents any challenge because it is on a high fill and there is a highway overpass bridge on one end.

If ACE were to choose to serve the downtown portion of Tracy with a new connection constructed between the Oakland Subdivision and the old SP Niles Tracy line, some of these sidings might not even be required. With all sidings lengthened to 8,000 feet, spaced no more than eight miles apart, there is more than ample capacity potential in the Oakland Subdivision for considerable growth. This is clearly demonstrated by RTC simulations. In addition, utilization of the Fresno Subdivision to bypass any congestion around the Lathrup Intermodal Facility and Stockton Yard also adds capacity.

The real capacity challenges are on the West End and are the result of capacity issues on the Niles and Coast Subdivisions. Even if the Oakland Subdivision between Niles Junction and Melrose were placed back into service, the congestion on the Niles Subdivision between Melrose and Oakland, through Jack London Square, is still the principal constraint to increasing traffic on the Oakland Subdivision. Currently discussions are under way to make three mainlines through Jack London.

D. Low Density Corridor – SMART Corridor

The proposed Smart Corridor as an example of a low density corridor.

The corridor has two segments; Cloverdale to Ignacio and Ignacio to Larkspur. Both corridor segments are portions of the Old North Western Pacific. This entire line has been out of service since 1998. There are no active shippers on either segment at present.

The NCRA has received a grant to place the Northern segment back in service and recently emergency repairs have begun at locations where there had been significant storm damage.

Until the railroad has been rehabilitated and is placed back in service it actually has no capacity. Once it is back in service, capacity will depend on four factors:

- First, the FRA class that the level of rehabilitation achieves…Depending on the extent of tie and rail replacement, this railroad could reach FRA class 4 standards. This would allow for 79 mph operation for passenger trains. However, initially this railroad will probably only meet FRA class 2 standards since initially, only NCRA freight operations will occupy the corridor.

- Second, the amount of freight business that the NCRA is able to attract. The two biggest potential uses of the line for freight are aggregates and municipal waste. There is very little real potential for any significant mixed manifest movements in either direction. This would imply that the most likely freight traffic level will never exceed three trains in each direction in any twenty four hour period.

- Third, the number and frequency of future SMART passenger trains.

- The fourth factor will be the length and number and location of passing sidings. At the present time there are very few siding on the Cloverdale to Ignacio segment and none on the Ignacio to Larkspur segment. The Corridor is generally 100 feet wide and clearly could be expanded to two main tracks for its entire length. Actually a single track railroad with passing sidings of sufficient length to chamber the longest freight trains contemplated, at most probably 8000 feet.

Ultimately, the practical capacity of this corridor will depend on the level of investment and the development of both a freight and passenger traffic base. There is no reason that the corridor can not meet any potential capacity requirement, given a sufficient investment in track and signal systems.